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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/462,796	01/13/2000	TAKAYOSHI WATANABE	500.38090X00	5528

7590 11/16/2004  
ANTONELLI TERRY STOUT & KRAUS  
1300 NORTH SEVENTEENTH STREET  
SUITE 1800  
ARLINGTON, VA 22209

EXAMINER

NGUYEN, THANH T

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/462,796

Applicant(s)

WATANABE ET AL.

Examiner

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 9/13/04.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 34-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 53 is/are allowed.
- 6) ☒ Claim(s) 34-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Request for Continued Examination*

The request filed on 9/13/04 for a Request for Continued Examination (RCE) under 37 CFR 1.114 is acceptable and a RCE has been established. An action on the RCE follows.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 34-52 are stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. (U.S. Patent No. 6,271,110) in view of Akira (JP Patent No. 05-121409), Ochiai et al. (U.S. Patent No. 5,643,831) and Michihiko et al. (JP Patent No. 05206221) as previously applied.

Referring to figures 2a-2b, Yamaguchi et al. teaches a method of producing a semiconductor device comprising the steps of:

Forming a plurality of pyramidal bump electrodes (34) on the semiconductor device, and  
Connecting the pyramidal bump electrodes (34) to pad electrodes (32) of the semiconductor device,

The step of forming the plurality of pyramidal bump electrodes including: a step of forming etched holes (14, called cavities, see figure 2a, col. 6, lines 60-67) by anisotropically etching base material having a crystal orientation (see col. 8, lines 37-42), and

A step of filling up the etched holes by plating a metal (see col. 9, lines 17-20) to form the pyramidal bump electrode (see figure 2B) by transferring a shape of the etched hole.

However, the reference does not teach etching a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes, forming a primary film of the same material as the metal for plating of the metal on the base material, and filling the metal such as gold/nickel, copper.

Akira teaches filling the opening with a copper or gold (20/26, see paragraph 21) by electroless plating.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would fill the opening with a copper or gold by electroless plating in process of Yamaguchi et al. as taught by Akira because the process would provide excellent selectivity and adhesive strength on the film.

Ochiai et al. teaches a method of etching a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes (see figures 8A-8H and related text).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would etch a first oxidized film on the base material, removing the first oxidized film and forming a second oxidized film on the etched holes in process of Yamaguchi et al. as taught by Ochiai et al. because the process would bring the plate

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into a chemically stable condition and provides a low wetability to the plate, so a durability of the plate is improve and formed solder balls can be easily transferred.

Michihiko teaches forming a primary film of the same material as the metal for plating of the metal on the base material (see page 3, paragraph#7, meeting claim 35).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a primary film of the same material as the metal for plating of the metal on the base material in process or Yamaguchi et al. as taught by Michihiko because the process would prevent generation of short-circuit.

It is known in the art to form the filling metal such as gold/nickel, copper.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form the filling metal such as gold/nickel, copper in process of Yamaguchi et al. because process in known in the art since determining the optimum material for the layer only involved routine skill in the art.

#### ***Allowable Subject Matter***

Claim 53 is allowable over the prior art.

#### ***Response to Arguments***

Applicant's arguments filed on 1/6/04 have been fully considered but they are not persuasive.

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Applicant contends that Yamaguchi et al. does not disclose or suggest to form the bump shape by transferring the anisotropic etch hole. In response to applicant that Yamaguchi et al. clearly teaches form the bump shape by transferring the anisotropic etch hole (see figure 2B).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).

A handwritten signature in black ink, appearing to read 'Thanh', with a long horizontal stroke extending to the left.

Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800